

Ectoparasites of bats from Nepal^{1,2}

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The ectoparasites collected from eleven species of Nepal bats are discussed. These records constitute the most comprehensive data presently available on the external parasites of Nepal Chiroptera. The ectoparasites consisted of nycteribiid flies (*Cyclopodia sykesii*, *Nycteribosca proxima*, *N. modesta*), argasid ticks (*Ornithodoros coniceps*, *Reticulinasus* sp., *Argas reflexus*, *A. vespertilionis*, *laelapid* (*Neolaelaps spinosa*) and spinturnicid (*Spinturnix plecotinus*) mites and several ischnopsyllid fleas (*Thaumapsylla breviceps*, *T. indicus*, *Mitchella exsula*).

INTRODUCTION

Very little information is available on the ectoparasites of the bats of Nepal. Ectoparasite records of Chiroptera from adjacent areas have been provided by Hoogstraal (1957), Kohls (1957), Hoogstraal & Kaiser (1968) and Kaiser & Hoogstraal (1974). The Indian Subregion including the Himalayas contains a varied endemic vertebrate and ectoparasite fauna that merits detailed analysis. General investigations on the external parasites of mammals excluding bats are available in the literature (Anastos 1950; Dhanda & Rao 1964; Emerson 1971; Hoogstraal 1970; Sharif 1928; Trapido & Hoogstraal 1964). Specific information concerning ectoparasites of Nepal bats is provided by Worth & Shah (1969) who list parasitic diptera and fleas from the fruit bat, *Rousettus leschenaulti*, laelapid mites from *Miniopterus schreibersi* and *Pteropus giganteus*, the flea *Ichnopsyllus indicus* identified from bats col-

lected near Kathmandu and by Lewis (1970) who described the flea *Mitchella exsula* from the pipistrelle bat, *Pipistrellus babu*. The purpose of this paper is to provide a current comprehensive list of the ectoparasites of Nepal bats. A detailed discussion of the geographical districts of Nepal is given by Karan (1960).

EQUIPMENT AND METHOD OF STUDY

The bats were collected by the senior author in Nepal between 1967 and 1970. The majority of specimens were collected with mist and insect nets, and several were shot. Each captured animal was immediately placed in a cloth bag and stored in a sealed metal container provided with a small quantity of chloroform to immobilize the ectoparasites. Later, each specimen was rubbed with a toothbrush over a white pan with special attention being focused around the eyes and ears for ticks, the belly fur for fleas and the urogenital region for mites.

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TABLE 1

ECTOPARASITES COLLECTED FROM NEPAL BATS
(1967 TO 1970)

Host Species	Collection Locality	Number Collected	Number Parasitized	Ectoparasite Species
Pteropodidae				
<i>Cynopterus sphinx</i>	Sankhuwasabha	3	3	<i>Thaumapsylla breviceps</i> (Siphonaptera: Ischnopsyllidae)
		3	3	<i>Nycteribosca modesta</i> (Diptera: Streblidae)
<i>Pteropus giganteus</i>	Kathmandu	20	17	<i>Neolaelaps spinosa</i> (Acari: Laelapidae)
			15	<i>Cyclopodia sykesii</i> (Diptera: Nycteribiidae)
<i>Rousettus leschenaulti</i>	Kathmandu	6	6	<i>Ornithodoros coniceps</i> (Acari: Argasidae)
			3	<i>Reticulinasus</i> sp. (Acari: Argasidae)
			6	<i>Thaumapsylla breviceps</i> (Siphonaptera: Ischnopsyllidae)
			2	<i>Cyclopodia sykesii</i> (Diptera: Nycteridiidae)
Rhinolophidae				
<i>Rhinolophus ferrumequinum</i>	Kathmandu	2	2	<i>Cyclopodia sykesii</i> (Diptera: Nycteribiidae)
			Sindu	6
5	<i>Cyclopodia sykesii</i> (Diptera: Nycteribiidae)			
3	<i>Nycteribosca proxima</i> (Diptera: Streblidae)			
Vespertilionidae				
<i>Barbestella leucomelas</i>	Sindu	1	1	<i>Spinturnix plecotinus</i> (Acari: Spinturnicidae)
<i>Eptesicus</i> sp.	Sankhuwasabha	1	1	<i>Argas</i> sp. (Acari: Argasidae)
<i>Myotis mystacinus</i>	Kathmandu	1	1	<i>Cyclopodia sykesii</i> (Diptera: Nycteribiidae)
<i>Nyctalus leisleri</i>	Dang-Deokhuri	1	1	<i>Argas vespertilionis</i> (Acari: Argasidae)
<i>Pipistrellus babu</i>	Sindu	7	6	<i>Spinturnix</i> sp. (Acari: Spinturnicidae)
			6	<i>Ischnopsyllus indicus</i> (Siphonaptera: Ischnopsyllidae)
			1	<i>Mitchella exsula</i> (Siphonaptera: Ischnopsyllidae)
<i>Scotophilus heathi</i>	Banke	5	5	<i>Argas vespertilionis</i> (Acari: Argasidae)

Each cloth bag was also carefully examined for ectoparasites. The ectoparasites were placed in vials containing 70 per cent alcohol.

Data on each host included the Nepal Project Number (NP), locality (Karan 1960), date, sex, field notes and ectoparasites. Ectoparasite determinations were performed by Dr. H. Hoogstraal (Acarina: Ixodoidea), director of the Medical Zoology Section, Naval Medical Research Unit, Cairo, Egypt, UAR; Dr. R. E. Lewis (Siphonaptera), Department of Entomology, Iowa State University, Ames, Iowa, USA; Dr. R. W. Strandtman (Acari) of the Bishop Museum, Hawaii; and Dr. R. Wenzel (Acari) of the Chicago Field Museum of Natural History, Chicago, Illinois, USA.

RESULTS AND DISCUSSION

The ectoparasites collected from 11 species of Nepal bats are listed in Table 1. These external parasites consisted of nycteribiid flies (*C. sykesii*, *N. proxima*, *N. modesta*), argasid ticks (*O. coniceps*, *Reticulinasus* sp., *A. reflexus*, *A. vespertilionus*), laelapid (*N. spinosa*) and spinturnicid (*S. plecotinus*), mites and several ischnopsyllid fleas (*T. breviceps*, *T. indicus*, *M. exsula*).

Previous investigations of bat flies (Diptera) have shown these ectoparasites to be representatives of the Nycteribiidae and Streblidae. The streblid, *Nycteribosca proxima*, was identified from only one species of bat (*R. lepidus*) in the present study. Bat flies of the family Nycteribiidae were identified from five species of Nepal bats (Table 1). All nycteribiids collected were identified as *Cyclopodia sykesii*. *C. sykesii* has been previously reported from *Pteropus giganteus*, *P. intermedius* and *Scotophilus kuhli* from the Oriental Region by Scott (1925).

Argasid ticks are obligate temporary parasites of vertebrates which prefer relatively open terrain where they frequent enclosed habitats such as caves, rock crevices and burrows (Balashov 1972). In this study, argasid ticks were identified on four species of Nepal bats collected from the districts of Kathmandu, Sankhuwasabha, Dang-Deokhuri and Banke (Karan 1960), all of which are characterized by terrain very similar to that described above as the preferred habitat of these ticks.

The laelapid mite, *Neolaelaps spinosa*, has been previously recorded from several Indian specimens of *Pteropus giganteus* by Radovsky (1967). Seventeen of twenty specimens of *P. giganteus* from Kathmandu were also found to be parasitized by this mite. *N. spinosa* has also been recorded from bats of Ceylon, Java, Australia and New Caledonia (Radovsky 1967).

Spinturnicid mites have been found to be exclusively parasitic on bats throughout their life cycle. A detailed discussion of the spinturnicids is given by Rudnick (1960). The spinturnicid mite identified from 3 species of Nepal bats in this study was *Spinturnix plecotinus*. This species has been previously recorded only from vespertilionid bats of the genus *Plecotus* (Rudnick 1960). The identification of *S. plecotinus* from specimens of *Rhinolophus lepidus* (Rhinolophidae), *Barbestella leucomelas* (Vespertilionidae) and *Pipistrellus babu* (Vespertilionidae) represents the first records of this mite from these bats.

Several ischnopsyllid fleas were also identified from bat specimens. *Thaumapsylla breviceps* was identified from two species of bats (Table 1). *Ischnopsyllus indicus* and *Mitchella exsula* were identified from the host *Pipistrellus babu*.

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